DOCUMENT RESUME

ED 321 230 CS 010 141

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TITLE Retention, Promotion, or Two-Tier Kindergarten: Which Reaches the At-Risk Reader More Effectively?
PUB DATE May 90
NOTE 20p.; Paper presented at the Annual Meeting of the International Reading Association (35th, Atlanta, GA, May 6-11, 1990).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Analysis of Variance; *Early Intervention; Educational Research; *Grade Repetition; *High Risk Students; *Kindergarten; Kindergarten Children; Preschool Education; *Reading Ability; Reading Achievement; *Student Promotion
IDENTIFIERS Iowa Tests of Basic Skills; Virginia

ABSTRACT

This study investigated the effectiveness of an intervention year prior to kindergarten for at-risk children age-eligible for school. The central question of the study asked if the experience of a developmental kindergarten was worth the extra year participating children must spend in the educational process. The format for the study was that of a three-way analysis of variance, with three groups of at-risk children: developmental kindergarten students (DK); retained students (RT); and students who were not retained (NRT). Children were placed in either the developmental or academic kindergarten on the basis of test placement results. Results indicated that there were significant program effects in favor of the DK students for all three academic outcome measures when comparing the DK students with the RT students, indicating probable program effects in those measures for the developmental kindergarten program. Three self-perception measures were significant for DK students when they were paired with the RT students: school ability, school behavior, and global self-worth. Results indicated significant probable program effects for and strong effect sizes for the children, specifically white and female children who attended developmental kindergarten. Those effects were present in all academic subject areas, in work/study habits, and for self-perceptions of scholastic ability. (Six tables of data and a figure are included.) (MG)

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Retention, Promotion or Two-Tier Kindergarten: Which Reaches the At-Risk Reader More Effectively?

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CS010141

Research Report
International Reading Association
Atlanta, May 6-11, 1990

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Retention, Promotion or Two-Tier Kindergarten:
Which Reaches the At-Risk Reader More Effectively?

Available studies in the area of developmental kindergartens confirm patterns of placing the youngest and least able students in intervention programs prior regular kindergarten. This research project continued the investigation of the effectiveness of an intervention year prior to kindergarten for at-risk children age-eligible for school. The central question of the study asked if the experience of a developmental kindergarten year was worth the extra year participating children must spend in the educational process. In order to answer the central question, the research examined several facets of the developmental kindergartner's growth during the intervention year to answer these questions:

* Does the developmental kindergarten student perform better academically than similarly at-risk students who did not have the developmental intervention year and either repeated a grade or remained on grade level?

* Does the developmental kindergarten student develop more positive self-perceptions than similarly at-risk students who did not have the developmental intervention year and either repeated a grade or remained on grade level?

METHOD

Design

The conceptual format for this study was that of a three-way analysis of variance, with three groups of at-risk children: developmental kindergarten students (DK), retained students (RT), and students who were not retained (NRT). Because the children could be at risk for many different reasons, a regression analysis was used to investigate possible group differences, and an analysis of covariance was used to adjust for such differences.

Subjects

Site. The district was located near a large Virginia city and encompassed an area of 446 square miles. It embarked on a developmental kindergarten pilot program in the fall of 1985.

Kindergarten Population. The total kindergarten population in the district in 1985-86 (N=2463) represented a cross section of students in the United States; 11.2% Black, 1.3% Asian, 1 (.0%) native American, .2% Hispanic, and 87.3% White. From this population of children age-eligible to begin kindergarten (five-years-old on or before December 31, 1985), 204 students across the district were selected for inclusion in the developmental kindergarten classes. These students attended classes in thirteen pilot schools. Seven of these pilot schools were Chapter 1 schools, eligible for federal funding because at least 25% of the children in attendance at the school met federal guidelines

for establishing economic need in programs such as Aid to Families with Dependent Children (AFDC) or free and reduced cost lunches. Four Chapter 1 schools did not offer the developmental kindergarten pilot program.

Group Selection. All subjects for the fourth year study attended the Chapter 1 schools. The Chapter 1 students were chosen for the study because they represented a group of schools from similar socioeconomic communities, and because standardized testing was carried out regularly at those schools to meet requirements for Chapter 1 aid. A large number of the children in these schools met the guidelines established for identifying children at-risk for school learning problems. The seven Chapter 1 schools piloting the developmental program had 118 developmental kindergarten (DK) students.

The DK group was selected through screening tests in May, 1985 along with parent consultations and administrative observations. Those placements were confirmed by additional tests and teacher observations in October, 1985. With three exceptions, all developmental kindergartners selected were in the lowest third on the Primary Mental Abilities Test and did not have a birthday in the first quarter of the school year. Those three exceptions were children placed in developmental kindergarten by parent request, and they were removed from the developmental kindergarten study group on the basis of their membership in other than the lowest range

on the ability test given to all incoming five-year-olds in the fall of 1985-86.

At the four Chapter 1 schools that did not run a developmental kindergarten pilot program, 149 children were selected for inclusion in the non-developmental program groups for the study. All children who began school in 1985-86 in these four schools were selected if they ranked in the lowest range on the ability test given in the fall, and if their birthdays did not fall in the first quarter of the year they were selected. The non-developmental students were divided into two groups: the RT group included all students in the non-developmental group who attended academic kindergarten and were retained sometime between kindergarten and second grade; and, the NRT group included all students identified for the study in the non-developmental schools who attended academic kindergarten and were never retained.

Procedures

Testing schedule. Initial screening was carried out for all pilot school children in May, 1985. The instrument was the Cooperative Preschool Inventory (CPI), a readiness screening test. School officials tentatively placed the children in either the developmental kindergarten or academic kindergarten program tracks on the basis of the test results.

Adjustments and confirmations of placement were made following a fall testing of all kindergarten students in

October, 1985. The battery of Primary Mental Ability Tests (PMA) was given children in both developmental pilot schools and non-developmental schools in early October. Local norms had been established for the tests, and final placement guidelines were based on those norms.

In the spring of the students' fourth year in school, a battery of tests was administered (Iowa Test of Basic Skills) and other information for additional measures was collected for purposes of the study. The following fall (1989) the Harter Self-Perception Profile for Children was administered to all third and fourth grade children in the Chapter 1 schools, including the children in this study.

Instruments. Family background and demographic information were collected from the family information forms required at kindergarten registration. These forms provided information for the background and demographic measures of age, race, sex, and parental occupation (see form in Appendix A). The schools provided information on students' individual free or reduced lunch eligibility. They also provided information on the numbers of students eligible for the free and reduced lunch program in their schools. This information was used to compute the school socioeconomic measure which is the percentage of free lunch recipients in the school.

Parental occupations were coded from 1 to 18 following the procedure described for the Duncan scale (Duncan, 1961). Individual student socioeconomic status (SES) was computed by standardizing the parent occupation and free and reduced

lunch information, and combining those data to create the measure.

Measures

In the current study, outcome measures in the fourth year were used to address the question of effects of a developmental kindergarten program on children's academic achievement, and self-perceptions.

Independent Measures. The results were adjusted for the independent measures of race, sex, age, individual SES, school SES, and predicted ability as measured by the Primary Mental Abilities test (PMA). Parent occupation and free or reduced lunch eligibility data were used for the SES measure. A factor was computed for the five PMA tests (verbal meaning, auditory discrimination, perceptual speed, spatial relations, and number facility) and a standardized score for the PMA factor was used as the independent measure for ability. Age was listed in years and months; sex was coded 1 = male and 2 = female; and, race was coded 1 = Asian, 2 = Black, 3 = Hispanic, 4 = Native American, and 5 = White. School SES was the percentage of free and reduced lunch recipients in each school.

Dependent Measures. Two types of dependent measures were used to evaluate the students' growth: academic measures including teacher evaluated report card grades and standardized test scores; and, self-perception levels self-reported on the Harter Self-Perception Profile for Children. These measures evaluated the students' perceptions of their

scholastic success and their ability to interact in the classroom with teachers and other students.

The mean grades of four grading periods were used as academic measures in addition to standardized test scores. Grades in the district were closely controlled from school to school by specific guidelines for assigning grades which were issued by the central administration.

Treatment

The treatment for this study of program effect was the developmental kindergarten program. Developmental kindergartens began operation in the district in the fall of 1985 using the High/Scope curriculum. The developmental kindergarten faculty received training from district personnel who were trained by the High/Scope Foundation in Ypsilanti, Michigan, and every effort was made to maintain the integrity of the program as it was designed.

RESULTS

Group Descriptive Information

Is the experience of developmental kindergarten worth the extra year children will be spending in school? A regression analysis procedure was used to investigate the strength of the different demographic and ability measures, and to select those that were significant for at least one of the outcome measures.

To address the central question of program effect, paired comparisons were performed across all measures using

an analysis of covariance procedure which permitted the adjustment for initial differences for the covariates of sex, socioeconomic status (SES), race, ability, school SES, and age. Table 1 describes the differences across the groups.

Academic Achievement

The first analyses paired the developmental kindergarten (DK) children with the children who attended an academic kindergarten program and subsequently experienced retention (RT) in either kindergarten or first grade. Both groups of children had completed second grade at the end of the four year longitudinal study. The academic outcome measures were the mean reading, language arts and spelling grades(GPA), and the standardized test measure (raw scores) from the Iowa Test of Basic Skills for the reading test administered at the end of the four year longitudinal study.

The second set of analyses paired the developmental kindergarten (DK) children on those same measures with similarly at-risk children who attended academic kindergarten and did not experience retention (NRT). Those children had completed third grade at the end of the four year study period. Table 2 shows the results of these two sets of analyses.

There were significant program effects in favor of the developmental kindergarten children for all three academic outcome measures when comparing the developmental students (DK) with the retained students (RT) indicating probable

program effects in those measures for the developmental kindergarten program. There were significant effects for all outcome measures in favor of the developmental students (DK) when they were compared with those who were not retained (NRT).

Self-Perception

The final measure for determining the program benefits for the developmental children was the effect of the program on the children's self-perceptions. The second set of paired comparisons was made using analyses of covariance to study the effects of the program on four self-perception domains: scholastic ability; social acceptance; school behavior; and global self-worth (Harter, 1985). Table 3 shows the results of those analyses.

Three self-perception measures were significant for developmental kindergarten children when they were paired with the retained students: school ability, school behavior and global self-worth. Only the self-perceptions of school behavior were significant when the developmental students were paired with the not retained students in the analyses of covariance (see Table 3).

Program effectiveness could not be concluded solely on the basis of these analyses of covariance. Significant findings indicated there were probable areas of program effect; and the next step analyzed the magnitude of the effects found.

Effect Size Analysis

It is increasingly common to present evaluation results in an effect size format (Light & Pillemer, 1984), calculated in standard deviation units. Effect sizes can serve as a measure of the strength of a program effect. It is generally agreed that effects of .1 sd. or less are inconsequential and those over .25 sd. are educationally meaningful, despite their statistical significance levels (Cohen & Cohen, 1983; Hoffer, Greeley, & Coleman, 1985; Lee, Gunn & Schnur, 1987; Rosenthal & Rosnow, 1984).

Academic Effect Sizes. Table 4 describes the effect sizes for all of the academic measures in the analysis of covariance tables.

Strong program effect sizes were probable for the developmental children (DK) when paired with the retained students (RT) for language arts, spelling and math. There was a moderate effect size for the ITBS reading test.

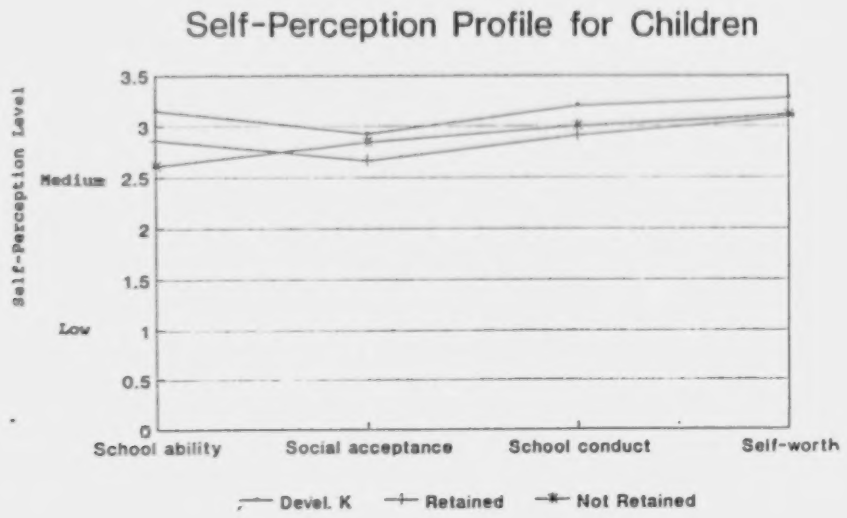
When the developmental kindergarten children (DK) were paired with the not retained children (NRT), there were probable strong effect sizes for teacher ratings of language arts, and spelling.

Self-Perception Effect Sizes. Although many of the teacher evaluations of social interaction skills and self-perceptions were significant in the analyses, only the work/study skills measure appeared to have a moderate program effect as measured by effect size for the developmental kindergarten (DK) children when they were

paired with the retained children (RT). There were no educationally meaningful effect sizes for the DK children with NRT comparison of self-perception measures.

Individual profiles of students' self-perceptions can be charted (Harter, 1982). The means of each domain were determined by study groups, and a profile of the groups constructed (see Figure 1).

Figure 1. Self-Perception Profiles for the Three Study Groups.



Subgroup Analyses

The next analyses questioned if the program was equally effective for all children who received it. Additional paired comparisons by sex and by race indicated those children for whom the program appeared to be most effective. There were no significant outcomes for the academic or self-perception measures for black children or for white male children. Outcomes for white children as a group are shown

in Table 5, and those for white female children are shown in Table 6.

In summary, developmental kindergarten children represented the youngest in the study, were those from the lowest SES groups, attended the schools with the highest percentage of free and reduced lunch recipients, and had the lowest mean on the aptitude pretest. However, after statistical adjustment for those covariate measures, there were significant probable program effects and strong effect sizes for the children, and specifically white and female children who attended developmental kindergarten. Those effects were present in all academic subject areas, in work/study habits[1] and for self-perceptions of scholastic ability.

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[1] Not reported here, but a significant part of the larger research project.

Table 1

Mean Age, Race, Gender, Socioeconomic Status of Groups and Schools, and Mean Ability Scores for Groups

Measure	DK	RT	NRT
Age in years at school entry	5.07	5.11	5.15
Racial % of groups			
white	67.3	80.5	82.2
black	29.5	17.0	17.8
asian	1.6	2.4	0
hispanic	1.6	0	0
Sex % of groups			
male	45.9	63.4	44.4
female	54.1	36.6	55.6
SES (% in lowest of three SES groups)	87.8 ** b	59.3 * c	45.2
PMA (combined test z scores)	-1.73 ** b	-1.39 * c	-.96
SCHSES (% of free lunch recipients at schools)	23.0 * ab	11.1	11.3

[a]significant difference between DK and RT;

[b]significant difference between DK and NRT;

[c]significant difference between RT and NRT.

Nominal significance levels are determined by computing the t-statistic of the difference between the groups. Probability levels are as follows: * = $p<.05$; ** = $p<.01$.

Table 2

Means, Standard Deviations and Significance Levels of Academic Outcome Measures in ANCOVA

Outcome measure	DK with RT				
	m	DKm	RTm	sd	p
Second Grade GPAs					
Reading GPA[a]	2.42	2.73	2.35	1.06	***
Language arts GPA	2.89	3.22	2.67	.60	***
Spelling GPA	3.13	3.42	2.93	.63	**
ITBS[b] Raw Scores on Form G/H					
ITBS Reading	42.96	51.38	40.90	24.67	**
	DK with NRT				
Reading GPA	2.46	2.73	2.31	1.09	***
Language arts GPA	2.87	3.22	2.50	.65	***
Spelling GPA	3.19	3.42	3.02	.64	*
ITBS Reading	42.96	51.38	43.87	24.44	***

Note. All significant differences favor the Developmental kindergarten children.

[a]GPA = Grade point average for four report periods

[b]ITBS = Iowa Test of Basic Skills

Significance levels * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 3

Means, Standard Deviations and Significance Levels of Self-Perception Outcome Measures in ANCOVA

Outcome measure	DK with RT				
	m	DKm	NRTm	sd	p
Student self-perceptions					
School ability	2.94[a]	3.15	2.62	.70	*
Social acceptance	2.79	2.92	2.84	.74	N/S
School behavior	3.02	3.20	3.00	.86	**
Global self-worth	3.12	3.28	3.11	.87	N/S
	DK with NRT				
School ability	2.84	3.15	2.62	.76	N/S
School acceptance	2.86	2.92	2.84	.70	N/S
School behavior	3.05	3.20	3.00	.82	**
Global self-worth	3.15	3.28	3.11	.83	N/S

Note. All significant differences favor the developmental kindergarten students.

[a]four points possible

Significance levels * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 4

Program Effect Sizes[a] for the Analyses of Covariance of the Academic Measures

Outcome measures	DK with RT	DK with NRT
Report card grade point averages		
	ES	ES
Reading GPA	.26	.31
Language arts GPA	.80	1.10
Spelling GPA	.66	.67
Iowa Test of Basic Skills		
ITBS reading	.40	.22

Note. Below .2 sd. units = small effect; .34 sd. units = moderate effect; above .5 sd. units = strong effect (Cohen & Cohen, p.59, 1983).

Table 5

Significant Outcomes in Analyses of Covariance for White Students

Measure	DK with RT			DK with NRT		
	Grade point average					
	m	sd	p	m	sd	p
Reading	2.61	1.04	*		N/S	
Spelling		N/S		3.27	.67	**
	Self-perceptions					
Scholastic ability	2.97	.74	*		N/S	
School behavior	3.02	.95	**	3.11	.83	***
Global self-worth	3.14	.88	***		N/S	

Note. Significant results in favor of the developmental kindergarten children.

[a]ITBS = Iowa Test of Basic Skills.

Significance levels * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

Table 6

Significant Differences on Analyses of Covariance for for White Female Students

Measure	DK with RT			DK with NRT		
	Report card grade point averages					
	m	sd	p	m	sd	p
Reading			N/S	2.98	.84	**
Language Arts	3.16	.43	***	3.05	.66	**
Spelling	3.39	.54	*		N/S	
	ITBS[a] Raw Score					
ITBS Reading	54.29	22.96	*		N/S	

Note. Significant in favor of the developmental kindergarten children.

[a]Iowa Test of Basic Skills.

Significance levels * = $p<.05$; ** = $p<.01$;*** = $p<.001$.